WHAT IS CLAIMED IS:

1. A method for separating metallic carbon nanotubes and semi-conducting carbon nanotubes, comprising:

providing a suspension containing a plurality of individual metallic carbon nanotubes and semi-conducting carbon nanotubes in a liquid, for which the dielectric constant ϵ_L meets the requirement:

$$\epsilon_M > \epsilon_L > \epsilon_H,$$

wherein ϵ_M is the dieletric constant of the metallic carbon nanotubes and ϵ_H is the dielectric constant of the semi-conducting carbon nanotubes;

applying a non-homogeneous electric alternating field to the suspension to create spatially separate species of the metallic carbon nanotubes and the semi-conducting carbon nanotubes; and

removing at least one of the separate species.

2. The method according to claim 1, wherein the providing step includes forming a suspension in water of the carbon nanotubes.

3. The method according to claim 2, including adding a surfactant to the suspension as a separating mechanism.

4. The method according to claim 1, wherein the applying step includes using an alternating field having a peak-to-peak field intensity selected from a range between about 10^3 V/m and about 10^9 V/m.

5. The method according to claim 4, wherein the range is about 10^4 V/m to about 10^6 V/m.

6. The method according to claim 4, wherein the peak-to-to field intensity is about 10^5 V/m.

7. The method according to claim 1, wherein the applying step includes using an alternating field having a frequency from a range between about 10kHz and about 100GHz.

8. The method according to claim 7, wherein the range is about 1MHz to about 100MHz.

9. The method according to claim 7, wherein the frequency is about 10MHz.

10. A method of separating metallic carbon nanotubes from semi-conducting carbon nanotubes comprising utilizing a dielectrophoresis cell comprising two electrodes and a liquid dielectric.

11. An arrangement for separating metallic carbon nanotubes from semi-conducting carbon nanotubes, comprising:

a semi-conducting substrate;

an insulating layer deposited on the semi-conducting substrate; and

metal electrodes deposited on the insulating layer which are connectable via contacts to an alternating voltage source.

12. The device according to claim 11, wherein the semi-conducting substrate comprises silicon, the insulation layer comprises silicon dioxide and the metal electrodes comprise gold.

13. The device according to claim 12, wherein the silicon is doped with boron.